In re OREN ET AL., Application No. 10/042,836
Amendment A

Amendments to the Specification:

Please replace the paragraph that begins on page 8, line 3 with the following amended paragraph (no new matter is being added):

Methods and apparatus are disclosed for implementing and using multiple virtual portions of one or more physical associative memories, such as, but not limited to a content-addressable memories. In one embodiment, an associative memory is programmed with multiple sets of entries, each of the multiple sets of entries including a different one of multiple unique decoder fields. A piece of information is received including a data item. In one embodiment, a decoder field is identified, such as from the piece of information or from another source. The decoder field and the data item are typically included in a lookup word used to perform a lookup operation in the associated memory, with the decoder field identifying which of the multiple sets of entries to search based on the data item and/or other data. In one embodiment, a nested condition associated with the data item is identified, and in response, a predefined set of decoder fields are identified and multiple lookup words are generated based on these decoder fields and the data item and/or other data. In one embodiment, a lookup indicator is forwarded from the device generating the multiple lookup words (or other device) to a consumer of the results for understanding the context of the results generated from the associative memory lookup operations performed on the generated multiple lookup words. In one embodiment, multiple levels of decoder fields are used to identify multiple subsets of entries within one or more of the multiple sets of entries. ~~within the~~

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Please add the following new ELEVEN (11) paragraphs BEFORE the paragraph that begins on page 8, line 21 of the originally filed specification (no new matter is being added):

One embodiment programs an associative memory with a plurality of sets of entries, each of the plurality of sets of entries associated with a different one of a plurality of unique decoder fields, and each entry within a particular one of the plurality of sets of entries including a same one of the plurality of unique decoder fields. A piece of information including a data item and a decoder value is received. A first lookup word including the data item and the decoder value is derived. A lookup operation is performed on the associative memory using the first lookup word to generate a first lookup result.

In one embodiment, a first set of the plurality of sets of entries includes a different number of entries than a second set of the plurality of sets of entries. In one embodiment, the decoder value includes a set value and a subset value. One embodiment also receives a second piece of information including a data item and a nested condition indication, identifies the nested condition, and generates a plurality of lookup words in response to said identifying, each of the plurality of lookup words including the data item and one of a plurality of predetermined decoder values.

One embodiment programs an associative memory with a plurality of sets of entries, each of the plurality of sets of entries including a different one of a plurality of unique decoder fields. A piece of information including a data item is received. A nested condition associated with the data item is identified. In response to said identifying the nested condition, a plurality of lookup words with a predefined set of decoder fields of the plurality of unique decoder fields are generated.

In one embodiment, the piece of information includes a nested condition indication. In one embodiment, the piece of information does not include a nested condition indication. In one embodiment, at least two of the plurality of sets of entries have a different number of entries. In one embodiment, each of the plurality of sets of entries has at least two entries. One embodiment

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forwards a lookup indication to a receiver. In one embodiment, the lookup indicator indicates the presence or absence of the nested condition. In one embodiment, the lookup indicator indicates a result context. One embodiment forwards the plurality of lookup words to an associative memory. In one embodiment, the associative memory includes a ternary or binary content-addressable memory. One embodiment performs a lookup operation on each of the plurality of lookup words to generate a plurality of lookup results. One embodiment compares a first lookup result of the plurality of lookup results with a second lookup result of the plurality of lookup results to identify whether to perform processing based on the first or second lookup result.

One embodiment performs for each particular one of a plurality of associative memory spaces: determining a size for said particular one of the plurality of associative memory spaces; allocating at least the size number of entries for said particular one of the plurality of associative memory spaces; assigning a unique decoder field to said particular one of the plurality of associative memory spaces; and adding said at least said size number of entries in the associative memory, wherein each of said at least said size number of entries includes the unique decoder field. In one embodiment, at least two of the plurality of associative memory spaces have a different number of said allocated entries.

One embodiment includes: a lookup word generator for receiving a data item and for generating a plurality of lookup words, each of the plurality of lookup words including the data item and a different one of a plurality of unique decoder fields; and an associated memory, coupled to the lookup word generator, for performing a lookup operation of each of the plurality of lookup word and to produce a plurality of associative memory results.

One embodiment includes a memory, coupled to the associative memory, to receive the plurality of associative memory results and to generate a plurality of memory lookup results. One embodiment includes a receiver to receive the plurality of memory lookup results; and wherein the lookup word generator further communicates a lookup indication to the receiver. One embodiment includes a receiver to receive the plurality of associative memory results. In one embodiment, the lookup word generator further communicates a lookup indication to the

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receiver. In one embodiment, the receiver compares a first associative memory result of the plurality of associative memory results with a second associative memory result of the plurality of associative memory results. In one embodiment, a result of said comparison of the first and second associative memory results determines the first associative memory result is to be processed.

One embodiment includes means for programming an associative memory with a plurality of sets of entries, each of the plurality of set of entries including a different one of a plurality of unique decoder fields; means for receiving a piece of information including a data item; means for identifying a nested condition associated with the data item; and means for generating in a plurality of lookup words with a predefined set of decoder fields of the plurality of unique decoder fields.

In one embodiment, the piece of information includes a nested condition indication. One embodiment includes means for forwarding a lookup indication to a receiver. In one embodiment, the lookup indicator indicates the presence or absence of the nested condition. One embodiment includes associative memory means for receiving the plurality of lookup words and for generating a plurality of lookup results.

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  Please replace the paragraph that begins on page 10, line 13 with the following amended paragraph (no new matter is being added):

  FIG. 1C illustrates how a decoder field 170, such as that used in programming an associative memory and used in performing a lookup operation of may be partitioned to identify a set of entries based on set decoder field 171 and a subset of the set of entries based on subset decoder field 172. In one embodiment, a particular set of entries can be searched with a corresponding set value specified in set decoder field 171 and wildcards programmed in subset decoder field 172. ~~While~~ In one embodiment, a particular subset of the particular set of entries can be searched with a corresponding set value specified in set decoder field 171 and a corresponding subset value programmed in subset decoder field 172. In one embodiment, for example, a set might include a category of entries, such as, but not limited to routing information, access lists, quality of service, etc., wherein a subset identifies a specific group of entries to be searched within a particular category of entries. In addition to being able to search a particular identifiable set, and subset within a set, multiple subsets in different sets can be simultaneously searched, for example, using a wildcard to identify the particular set.

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